

A

VOYAGE
TOWARDS
THE NORTH POLE:

UNDERTAKEN

By His MAJESTY's COMMAND,

1773.

By CONSTANTINE JOHN PHIPPS.

DUBLIN:

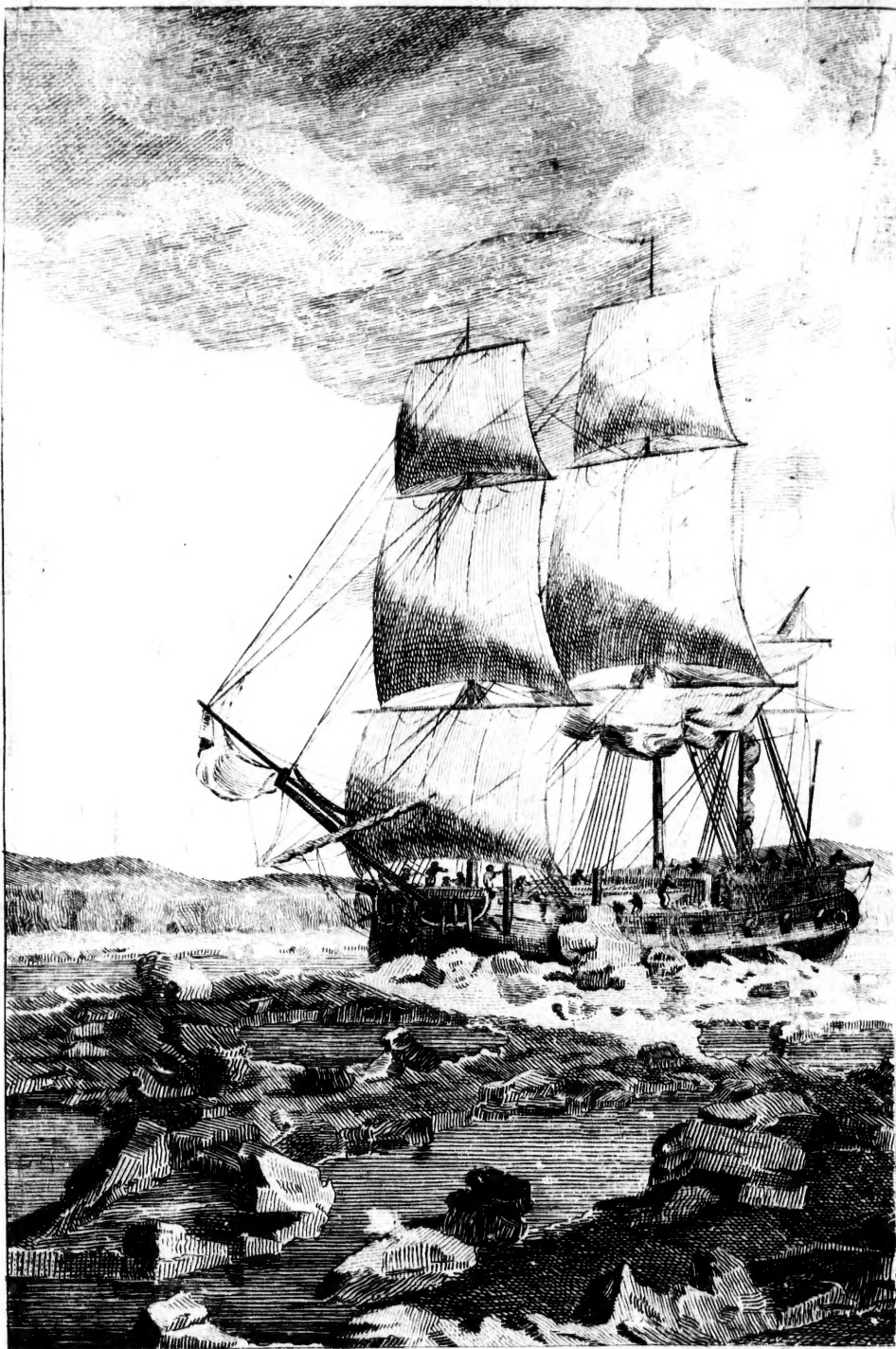
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The RACEHORSE and CARCASS

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T O

THE KING.

S I R E,

AS a Sea Officer addressing Your MAJESTY on a professional Subject, I might justly be accused of singular Ingratitude, did I not avail myself of this Opportunity of reminding the World, that the Voyage to explore how far Navigation was practicable towards the North Pole was undertaken at a Period peculiarly distinguished by Your MAJESTY's gracious Attention to Your Navy.

In a Time of profound Peace Your MAJESTY, by a liberal Addition to the Half Pay of the Captains, relieved the Necessities of many, and gratified the Ambition of all, at once demonstrating Your MAJESTY's Regard to their Welfare, and the Remembrance of their Services.

The Armament, which followed in a few Months, and Your MAJESTY's Review of that Armament, which, by the Dispatch of its Equipment, had prevented a War, afforded to Your Navy the most flattering and distinguished Mark of Royal Favour, and to Your MAJESTY an additional Proof of that Alacrity for Your Service, which had so recently received both its Reward and Encouragement from Your MAJESTY's Protection.

Permit me, SIRE, to add, that Your MAJESTY's gracious Approbation of my Endeavours, and the Permission I have been honoured with, of inscribing the following Account of them to Your MAJESTY, are strong Proofs of that Indulgence with which Your MAJESTY receives every Attempt to promote Your Service. — An Indulgence, which, at the same Time that it cannot fail of animating the Zeal of others more worthy of Your MAJESTY's Notice, has added to the most devoted Attachment, the warmest Gratitude of,

SIRE,

Your MAJESTY's most dutiful

Subject and Servant,

CONSTANTINE JOHN PHIPPS.

INTRODUCTION.

THE Idea of a passage to the East Indies by the North Pole was suggested as early as the year 1527, by Robert Thorne, merchant, of Bristol, as appears from two papers preserved by Hackluit ; the one addressed to king Henry VIII. the other to Dr. Ley, the king's ambassador to Charles V. In that addressed to the king he says, " I know it to be my bounden duty to manifest this secret to your Grace, " which hitherto, I suppose, has been hid." This secret appears to be the honour and advantage which would be derived from the discovery of a passage by the North Pole. He represents in the strongest terms the glory which the kings of Spain and Portugal had obtained by their discoveries East and West, and exhorts the king to emulate their fame by undertaking discoveries towards the North. He states in a very masterly style the reputation that must attend the attempt, and the great benefits, should it be crowned with success, likely to accrue to the subjects of this country, from their advantageous situation ; which, he observes, seems to make the exploring this, the only hitherto undiscovered part, the king's peculiar duty.

To remove any objection to the undertaking which might be drawn from the supposed danger, he insists upon " the great advantages of constant day-light in " seas, that, men say, without great danger, difficult, and peril, yea, rather, it is impossible to " pass ; for they being past this little way which

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“ they named so dangerous (which may be two or
 “ three leagues before they come to the Pole, and as
 “ much more after they pass the Pole) it is clear
 “ from thenceforth the seas and lands are as tempe-
 “ rate as in these parts.”

In the paper addressed to Dr. Ley he enters more minutely into the advantages and practicability of the undertaking. Amongst many other arguments to prove the value of the discovery, he urges, that by sailing northward and passing the Pole, the navigation from England to the Spice Islands would be shorter, by more than two thousand leagues, than either from Spain by the Straits of Magellan, or Portugal by the Cape of Good Hope ; and to shew the likelihood of success in the enterprize he says, it is as probable that the cosmographers should be mistaken in the opinion they entertained of the polar regions being impassible from extreme cold, as, it has been found, they were, in supposing the countries under the Line to be uninhabitable from excessive heat. With all the spirit of a man convinced of the glory to be gained, and the probability of success in the undertaking, he adds,—
 “ God knoweth, that though by it I should have no
 “ great interest, yet I have had, and still have, no
 “ little mind of this business: so that if I had faculty
 “ to my will, it should be the first thing that I would
 “ understand, even to attempt, *If our seas North-*
 “ *ward be navigable to the Pole or no.*” Notwith-
 standing the many good arguments, with which he supported his proposition, and the offer of his own services, it does not appear that he prevailed so far as to procure an attempt to be made.

Borne, in his *Regiment of the Sea*, written about the year 1577, mentions this as one of the five ways to Cathay, and dwells chiefly on the mildness of climate which he imagines must be found near the Pole, from the constant presence of the sun during the summer. These arguments, however, were soon after controverted by Blundeville, in his *Treatise on Universal Maps*.

In 1578, George Best, a gentleman who had been with Sir Martin Frobisher in all his voyages for the discovery of the North West passage, wrote a very ingenious

ingenious discourse, to prove all parts of the world habitable.

No voyage, however, appears to have been undertaken to explore the circumpolar seas, till the year 1607, when " Henry Hudson was set forth, at the " charge of certain worshipful merchants of London, to discover a passage by the North Pole to " Japan and China." He sailed from Gravesend on the first of May, in a ship called the Hopewell, having with him ten men and a boy. I have taken great pains to find his original journal, as well as those of some others of the adventurers who followed him; but without success: the only account I have seen is an imperfect abridgment in Purchas, by which it is not possible to lay down his track; from which, however, I have drawn the following particulars:—He fell in with the land to the Westward in latitude 73° , on the twenty-first of June, which he named Holdwith-Hope. The twenty-seventh, he fell in with Spitsbergen, and met with much ice; he got to eighty degrees twenty-three minutes, which was the Northernmost latitude he observed in. Giving an account of the conclusion of his discoveries, he says, " On " the sixteenth of August I saw land, by reason of " the clearness of the weather, *stretching far into* " *eighty-two degrees*, and, by the bowing and shewing of the sky, much farther; which, when I first " saw, I hoped to have had a free sea between the " land and the ice, and meant to have compassed this " land by the North; but now finding it was impossible, by means of the abundance of ice compassing us about by the North, and joining to the land; " and seeing God did bless us with a wind, we returned, bearing up the helm." He afterwards adds: " And this I can assure at this present, that " between seventy-eight degrees and an half, and " eighty-two degrees, by this way there is no passage."—In consequence of this opinion, he was the next year employed on the North East discovery.

In March 1609, old style, " A voyage was set forth by the right worshipful Sir Thomas Smith, " and the rest of the Muscovy Company, to Cherry " Island, and for a further discovery to be made to-

“wards the North Pole, for the likelihood of a trade
 “or a passage that way, in the ship called the Amity,
 “of burthen seventy tuns, in which Jonas Poole was
 “master, having fourteen men and one boy.”—He
 weighed from Blackwall, March the first, old style;
 and after great severity of weather, and much difficulty
 from the ice, he made the South part of Spitz-
 bergen on the 16th of May. He sailed along and
 sounded the coast, giving names to several places,
 and making many very accurate observations. On
 the 26th, being near Fair Foreland, he sent his mate
 on shore;—and, speaking of the account he gave at
 his return, says, “Moreover, I was certified that all
 “the ponds and lakes were unfrozen, they being
 “fresh water; which putteth me in hope of a mild
 “summer here, after so sharp a beginning as I have
 “had; and my opinion is such, and I assure myself
 “it is so, that a passage may be as soon attained this
 “way by the Pole, as any unknown way whatsoe-
 “ver, by reason the sun doth give a great heat in
 “this climate, and the ice (I mean that freezeth
 “here) is nothing so huge as I have seen in seventy-
 “three degrees.”

These hopes, however, he was soon obliged to re-
 linquish for that year, having twice attempted in vain
 to get beyond $79^{\circ} 50'$. On the 21st of June, he
 stood to the Southward, to get a loading of fish, and
 arrived in London the last of August. He was em-
 ployed the following year (1611) in a small bark call-
 ed the Elizabeth, of 50 tuns. The instructions for
 this voyage, which may be found at full length in
 Purchas, are excellently drawn up: They direct him,
 after having attended the fishery for some time, to at-
 tempt discoveries to the North Pole as long as the sea-
 son will permit; with a discretionary clause, to act
 in unforeseen cases as shall appear to him most for
 the advancement of the discovery, and interest of his
 employers. This however proved an unfortunate voy-
 age: for having staid in Cross Road till the 16th of
 June, on account of the bad weather, and great quan-
 tity of ice, he sailed from thence on that day, and
 steered W b N fourteen leagues, where he found a
 bank of ice: he returned to Cross Road; from
 whence,

whence, when he sailed, he found the ice to lie close to the land, about the latitude of 80° , and that it was impossible to pass that way; and the strong tides making it dangerous to deal with the ice, he determined to stand along it to the Southward, to try if he could find the sea more open that way, and so get to the Westward, and proceed on his voyage. He found the ice to lie nearest S W and S W b S and ran along it about an hundred and twenty leagues. He had no ground near the ice at 160, 180, or 200 fathoms: perceiving the ice still to trend to the Southward, he determined to return to Spitsbergen for the fishery, where he lost his ship.

In the year 1614, another voyage was undertaken, in which Baffin and Fotherby were employed. With much difficulty, and after repeated attempts in vain with the ship, they got with their boats to the firm ice, which joined to Red-Beach; they walked over the ice to that place, in hopes of finding whale-fins, &c. in which they were disappointed. Fotherby adds, in his account, "Thus, as we could not find what we desired to see, so did we behold that which we wished had not been there to be seen; which was great abundance of ice, that lay close to the shore, and also off at sea as far as we could discern." On the eleventh of August, they sailed from Fair-Haven, to try if the ice would let them pass to the Northward, or Northeastward; they steered from Cape Barren, or Vogel Sang, N E b E eight leagues, where they met with the ice, which lay E b S and W b N. The fifteenth of August they saw ice frozen in the sea of above the thickness of an half-crown.

Fotherby was again fitted out the next year in a pinnace of twenty tons, called the Richard, with ten men. In this voyage he was prevented by the ice from getting farther than in his last. He refers to a chart, in which he had traced the ship's course on every traverse, to shew how far the state of that sea was discovered between eighty and seventy-one degrees of latitude, and for twenty-six degrees of longitude from Hackluit's headland. He concludes the account of his voyage in the following manner:

"Now,

10 INTRODUCTION.

“ Now, if any demand my opinion concerning
 “ hope of a passage to be found in those seas, I an-
 “ swer ; that it is true, that I both hoped and much
 “ desired to have passed further than I did, but was
 “ hindered with ice ; wherein although I have not at-
 “ tained my desire, yet forasmuch as it appears not
 “ yet to the contrary, but that there is a spacious sea
 “ betwixt Groinland and king James his new land,
 “ [Spitsbergen] although much pestered with ice ;
 “ I will not seem to dissuade this worshipful company
 “ from the yearly adventuring of 150 or 200 pounds
 “ at the most, till some further discovery be made of
 “ the said seas and lands adjacent.” It appears that
 the Russia company, either satisfied with his endeavours and despairing of further success, or tired of the expence of the undertaking, never employed any more ships on this discovery.

All these voyages having been fitted out by private adventurers, for the double purpose of discovery and present advantage ; it was natural to suppose, that the attention of the navigators had been diverted from pursuing the more remote and less profitable object of the two, with all the attention that could have been wished. I am happy, however, in an opportunity of doing justice to the memory of these men ; which, without having traced their steps, and experienced their difficulties, it would have been impossible to have done. They appear to have encountered dangers, which at that period must have been particularly alarming from their novelty, with the greatest fortitude and perseverance ; as well as to have shewn a degree of diligence and skill, not only in the ordinary and practical, but more scientific parts of their profession, which might have done honour to modern seamen, with all their advantages of later improvements. This, when compared with the accounts given of the state of navigation, even within these forty years, by the most eminent foreign authors, affords the most flattering and satisfactory proof of the very early existence of that decided superiority in naval affairs which has carried the power of this country to the height it has now attained.

This

INTRODUCTION.

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This great point of geography, perhaps the most important in its consequences to a commercial nation and maritime power, but the only one which had never yet been the object of royal attention, was suffered to remain without further investigation, from the year 1615 till 1773, when the Earl of Sandwich, in consequence of an application which had been made to him by the Royal Society, laid before his Majesty, about the beginning of February, a proposal for an expedition to try how far navigation was practicable towards the North Pole; which his Majesty was pleased to direct should be immediately undertaken, with every encouragement that could countenance such an enterprize, and every assistance that could contribute to its success.

As soon as I heard of the design, I offered myself, and had the honour of being entrusted with the conduct of this undertaking. The nature of the voyage requiring particular care in the choice and equipment of the ships, the Racehorse and Carcass bombs were fixed upon as the strongest, and therefore properest for the purpose. The probability that such an expedition could not be carried on without meeting with much ice, made some additional strengthening necessary: they were therefore immediately taken into dock, and fitted in the most compleat manner for the service. The complement for the Racehorse was fixed at ninety men, and the ordinary establishment departed from, by appointing an additional number of officers, and entering effective men instead of the usual number of boys.

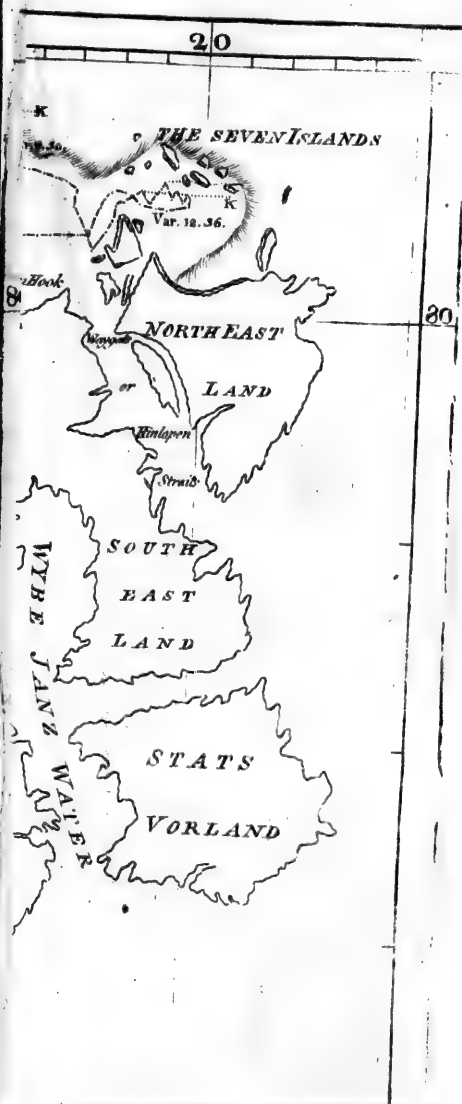
I was allowed to recommend the officers; and was very happy to find, during the course of the voyage, by the great assistance I received on many occasions from their abilities and experience, that I had not been mistaken in the characters of those upon whom so much depended in the performance of this service. Two masters of Greenlandmen were employed as pilots for each ship. The Racehorse was also furnished with the new chain-pumps made by Mr. Cole, according to Captain Bentinck's improvements, which were found to answer perfectly well. We also made use of Dr. Irving's apparatus for distilling fresh water from

from the sea, with the greatest success. Some small but useful alterations were made in the species of provisions usually supplied in the navy; an additional quantity of spirits was allowed for each ship, to be issued at the discretion of the commanders, when extraordinary fatigue or severity of weather might make it expedient. A quantity of wine was also allotted for the use of the sick. Additional cloathing, adapted to the rigor of that climate, which from the relations of former navigators we were taught to expect, was ordered to be put on board, to be given to the seamen when we arrived in the high latitudes. It was foreseen that one or both of the ships might be sacrificed in the prosecution of this undertaking; the boats for each ship were therefore calculated, in number and size, to be fit, on any emergency, to transport the whole crew. In short, every thing which could tend to promote the success of the undertaking, or contribute to the security, health, and convenience of the ships' companies, was granted.

As a voyage of this kind would probably afford many opportunities of making experiments and observations in matters relative to navigation, I took care to provide myself with all the best instruments hitherto in use, as well as others which had been imperfectly, or never, tried.

In the Journal which follows, I mean to confine myself to the occurrences of the voyage as they succeeded in order of Time; which, for the convenience of the generality of readers, I have reduced from the nautical to the civil computation.

A voyage of a few months to an uninhabited extremity of the world, the great object of which was to ascertain a very interesting point in geography, cannot be supposed to afford much matter for the gratification of mere curiosity.



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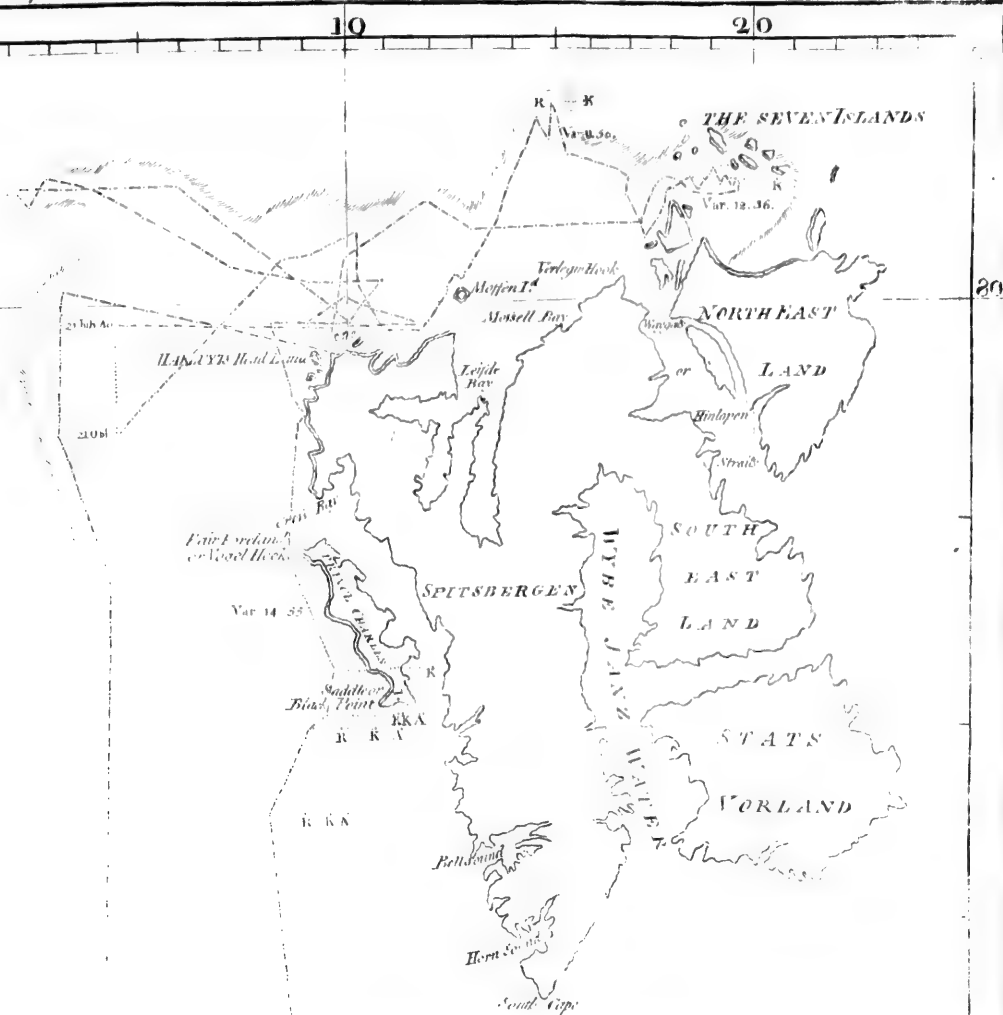
To front the Title.

CHART
showing
the TRACK of
His MAJESTY'S Sloops
 RACEHORSE and CARCASS
during
the Expedition towards
the
 NORTH POLE.
 1773.

*PART**OF*

[May.

To front the Title.



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JOURNAL.

APRIL 19th, 1773, I received my commission for the Racehorse, with an order to get her fitted with the greatest dispatch, for a voyage of discovery towards the North Pole, and to proceed to the Nore for further orders.

23d. The ship was hauled out of dock.

May 21st. The ship being manned and rigged, and having got in all the provisions and stores, except the Gunner's, we fell down to Galleons.

22d. We received on board the powder, with eight six-pounders, and all the gunner's stores. Lord Sandwich gave us the last mark of the obliging attention he had shewn during the whole progress of the equipment, by coming on board to satisfy himself, before our departure, that the whole had been compleated to the wish of those who were embarked in the expedition. The Easterly winds prevented our going down the river till the 26th, when I received my instructions for the voyage, dated the 25th; directing me to fall down to the Nore in the Racehorse, and there taking under my command the Carcass, to make the best of my way to the Northward, and proceed up to the North Pole, or as far towards it as possible, and as nearly upon a meridian as the ice or other obstructions might admit; and, during the course of the voyage, to make such observations of every kind as might be useful to navigation, or tend to the promotion of natural knowledge: in case of arriving at the Pole, and even finding free navigation

vigation on the opposite meridian, not to proceed any farther; and at all events to secure my return to the Nore before the winter should set in. There was also a clause authorizing me to proceed in unforeseen cases, according to my own discretion; and another clause directing me to prosecute the voyage on board the Carcass, in case the Racehorse should be lost or disabled.

27th. I anchored at the Nore, and was joined by Captain Lutwidge, in the Carcass, on the 30th: her equipment was to have been in all respects the same as that of the Racehorse, but when fitted, Captain Lutwidge finding her too deep in the water to proceed to sea with safety, obtained leave of the Admiralty to put six more guns on shore, to reduce the complement to eighty men, and return a quantity of provisions proportionable to that reduction. The officers were recommended by Captain Lutwidge, and did justice to his penetration by their conduct in the course of the voyage. During our stay here, Mr. Lyons landed with the astronomical quadrant at Sheerness fort, and found the latitude to be $51^{\circ} 31' 30''$, longitude $0^{\circ} 30'$ East. The easterly winds prevented our moving this day and the following.

June 2d. Having the wind to the Westward of North, at five in the morning I made the signal to weigh; but in less than half an hour, the wind shifting to the Eastward and blowing fresh, I furled the topsails. The wind came in the afternoon to N b E; we weighed, but did not get far, the tide of flood making against us.

3d. The wind blowing fresh all day Easterly, we did not move.

4th. The wind coming round to the Westward at six in the morning, I weighed immediately, and sent the boat for Captain Lutwidge, to deliver him his orders. At 10 A. M. longitude by the watch $56'$ E. At noon the latitude observed was $51^{\circ} 37' 36''$ N. At eight in the evening we had got as far as Balsey Cliff, between Orford and Harwich. Little wind at night.

5th. Anchored in Hoscley Bay at half past seven in the evening, in five and an half fathom water. Orford Castle N, E b N.

Angle

Angle between Aldborough Church and Or-	}	7°	38'
ford Light House,			
Light House and Orford Church, - -		18	16
Orford Church and Castle, - - - -		2	20
Castle and Hoseley Church, - - - -		100	59
Hoseley and Balley Church, - - - -		35	27

6th. At five in the morning, the wind at S S W, weighed, and stood out to sea, finding I might lose two tides by going through Yarmouth Roads. Examined the log line, which was marked forty-nine feet; the glass was found, by comparing it with the time-keeper, to run thirty seconds: at noon latitude observed $52^{\circ} 16' 54''$, longitude by the watch $1^{\circ} 30' 15''$ E.

Angle between Southwold and Walderswick $10^{\circ} 39'$
 Walderswick and Dunwich, - - - - $20 21$
 Dunwich and Aldborough, - - - - $46 53$
 Southwold N W $\frac{1}{4}$ N, supposed distance three leagues. We concluded the latitude of Southwold to be $52^{\circ} 22'$, and longitude $1^{\circ} 18' 15''$ E. The dip was $73^{\circ} 22'$.

7th. The wind was Northerly all day, and blew fresh in the morning. We had stood far out in the night and the day before, to clear the Lemon and Ower.

8th. Little wind most part of the day, with a very heavy swell. Stood in for the land. At half past ten longitude by the watch $0^{\circ} 41' 15''$ E. At noon the latitude was $53^{\circ} 38' 37''$. We saw the high land near the Spurn, in the evening.

9th. About noon Flamborough Head bore N W b N distant about six miles: we were by observation in latitude $54^{\circ} 4' 54''$, longitude $0^{\circ} 27' 15''$ E; which makes Flamborough Head, in latitude $54^{\circ} 9'$, longitude $0^{\circ} 19' 15''$ E. In the afternoon we were off Scarborough. Almost calm in the evening.

10th. Anchored in the morning for the tide in Robin Hood's Bay, with little wind at N W: worked up to Whitby Road next tide, and anchored there at four in the afternoon, in fifteen fathom, with very little wind.

11th. Calm in the morning; compleated our water, live stock and vegetables. At nine in the morning longitude observed by the watch $1^{\circ} 55' 30''$ W;
 Whitbey

Whitbey Abbey bore S $\frac{1}{2}$ W. Weighed with the wind at S E, and steered N E b N to get so far into the mid-channel as to make the wind fair Easterly or Westerly, without being too near either shore, before we were clear of Shetland and the coast of Norway.

12th. The wind at S E, and the ship well advanced, I ordered the allowance of liquor to be altered, serving the ship's company one-fourth of their allowance in beer, and the other three-fourths in brandy ; by which means the beer was made to last the whole voyage, and the water considerably saved. One half of this allowance was served immediately after dinner, and the other half in the evening. It was now light enough all night to read upon deck.

13th. The weather still fine, but considerably less wind than the day before, and in the afternoon more Northerly. The longitude at ten in the morning was found by my watch $0^{\circ} 6' W$. We took three observations of the moon and sun for the longitude ; the extremes differed from one another near two degrees : the mean of the three gave the longitude $1^{\circ} 37' E$. At noon the latitude observed was $59^{\circ} 32' 31''$. We found a difference of $36'$ between the latitude by dead reckoning and observation, the ship being so much more Northerly than the reckoning. The distance of this log was too short by forty-three miles. A log marked forty-five feet, according to the old method, would have agreed with the observation within two miles in the two days' run. The circumstance of steering upon a meridian, which afforded me such frequent opportunities of detecting the errors of the log, induced me to observe with care the comparative accuracy of the different methods of dividing the line, recommended by mathematicians, or practised by seamen. In the afternoon I went on board the Carcass to compare the time-keepers by my watch. At six in the evening the longitude by my watch $0^{\circ} 4' E$. This evening the sun set at twenty-four minutes past nine, and bore about N N W by the compass. The clouds made a beautiful appearance long after to the Northward, from the reflection of the sun below the horizon. It was quite light all night ; the Carcass made the signal for seeing the land in the evening.

14th.

14th. Little wind, or calm, all day ; but very clear and fine weather. Made several different observations for the longitude by the sun and moon, and by my watch. The longitude of the ship was found by my watch, at ten in the morning, to be $1^{\circ} 11' 45''$ W. The longitude by the lunar observations differed near two degrees from one another. By the mean of them the ship was in longitude $2^{\circ} 57' 45''$ W. Some Shetland boats came on board with fish. At noon the latitude by observation was $60^{\circ} 16' 45''$. At one in the afternoon the dip was observed to be $73^{\circ} 30'$; and at eight $75^{\circ} 18'$: the evening calm, and very fine; the appearance of the sky to the Northward very beautiful. Variation, by the mean of several observations, $22^{\circ} 25'$ W.

15th. By an observation at eight in the morning, the longitude of the dip was by the watch $0^{\circ} 39'$ W: dip $74^{\circ} 52'$. At half past ten in the morning, the longitude, from several observations of the sun and moon, was $0^{\circ} 17'$ W; at noon being in latitude $60^{\circ} 19' 8''$, by observation, I took the distance between the two ships by the Megameter; and from that base determined the position of Hangcliff, which had never before been ascertained, though it is a very remarkable point, and frequently made by ships. According to these observations it is in latitude $60^{\circ} 9'$, and longitude $0^{\circ} 56' 30''$ W. At one, observed the dip to be 75° . A thick fog came on in the afternoon, with a flat calm; we could not see the Carcass, but heard her answer the signals for keeping company. Variation, from the mean of several observations, $25^{\circ} 1'$ W.

16th. A very thick fog in the morning; latitude observed at noon $60^{\circ} 29' 17''$: the dip was observed at nine in the evening to be $76^{\circ} 45'$. In the afternoon, the weather clear, and the wind fair, steered NNE: sent Captain Lutwidge his further orders and places of rendezvous.

17th. Wind fair, and blowing fresh at SSW, continued the course NNE: ordered the people a part of the additional cloathing: saw an English sloop, but had no opportunity of sending letters on board, the sea running high. At ten in the morning, longitude by the watch $0^{\circ} 19' 45''$ W: at noon, the latitude observed

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was $62^{\circ} 59' 27''$. The ship had out-run the reckoning eleven miles. I tried Bouguer's log twice this day, and found it give more than the common log. Variation $19^{\circ} 22' W$.

18th. Little wind all day, but fair, from S S W to S E : still steering N N E : latitude observed at noon $65^{\circ} 18' 17''$. At three in the afternoon, sounded with 300 fathom of line, but got no ground. Longitude by the watch $1^{\circ} 0' 30'' W$.

19th. Wind to the N W. Took the meridian observation at midnight for the first time : the sun's lower limb $0^{\circ} 37' 30''$ above the horizon ; from which the latitude was found $66^{\circ} 54' 39'' N$: at four in the afternoon, longitude by the watch $0^{\circ} 58' 45'' W$: at six the variation $19^{\circ} 11' W$.

20th. Almost calm all day. The water being perfectly smooth, I took this opportunity of trying to get soundings at much greater depths than I believe had ever been attempted before. I sounded with a very heavy lead the depth of 780 fathom, without getting ground ; and by a thermometer invented by Lord Charles Cavendish for this purpose, found the temperature of the water at that depth to be 26° of Fahrenheit's thermometer ; the temperature of the air being $48^{\circ} \frac{1}{2}$.

We began this day to make use of Doctor Irving's apparatus for distilling fresh water from the sea : repeated trials gave us the most satisfactory proof of its utility : the water produced from it was perfectly free from salt, and wholesome, being used for boiling the ship's provisions ; which convenience would alone be a desirable object in all voyages, independent of the benefit of so useful a resource in case of distress for water. The quantity produced every day varied from accidental circumstances, but was generally from thirty-four to forty Gallons, without any great addition of fuel. Twice indeed the quantity produced was only twenty-three gallons on each distillation ; this amounts to more than a quart for each man, which, though not a plentiful allowance, is much more than what is necessary for subsistence. In cases of real necessity I have no reason to doubt that a much greater quantity

quantity might be produced without an inconvenient expence of fuel.

21st. A fresh gale at S E all day ; steered N N E. At four in the morning we spoke with a snow from the seal fishery, bound to Hamburgh, by which we sent some letters. At six in the morning the variation, by the mean of several observations, was $23^{\circ} 18' W$. longitude by the watch at nine was $0^{\circ} 34' 30'' W$. Latitude observed at noon $68^{\circ} 5'$.

22d. Calm most part of the day ; rainy and rather cold in the evening. At noon observed the dip to be $77^{\circ} 52'$.

23d. Very foggy all day ; the wind fair ; altered the course and steered N E and E N E, to get more into the mid channel, and to avoid falling in with the Western ice, which, from the increasing coldness of the weather, we concluded to be near. At seven o'clock in the morning, being by our reckoning to the Northward of 72° , we saw a piece of drift wood, and a small bird called a Redpoll. Dip observed at nine in the evening to be $81^{\circ} 30'$.

24th. Very foggy all the morning ; the wind came round to the Northward. The dip observed at noon was $80^{\circ} 35'$. In the afternoon, the air much colder than we had hitherto felt it ; the thermometer at 34° . A fire made in the cabin for the first time, in latitude $73^{\circ} 40'$.

25th. Wind Northerly, with a great swell ; some snow, but in general clear. At eight in the morning, the longitude observed by the watch was $7^{\circ} 15' E$. Made several observations on the variation, which we found, by those taken at seven in the morning, to be $17^{\circ} 9' W$; by others at three in the afternoon, only $7^{\circ} 47' W$. I could not account for this very sudden and extraordinary decrease, as there were several different observations taken both in the morning and evening, which agreed perfectly well with each other, without any apparent cause which could produce an error affecting all the observations of either set. At eight in the evening the longitude by the moon was $12^{\circ} 57' 30'' E$, which differed $2^{\circ} 35'$ from that by the watch. Little wind at night.

26th. Little wind all day ; the weather very fine and moderate. The latitude observed at noon was

74° 25'. The thermometer exposed to the sun, which shone very bright, rose from 41° to 61° in twenty minutes. By each of two lunar observations which I took with a sextant of four inches radius, at half past one, the longitude was 9° 57' 30'' E; which agreed within thirty-seven minutes with an observation made by the watch at half an hour after three, when the longitude was 8° 52' 30' E. Dip 79° 22'.

27th. At midnight the latitude observed was 74° 26''. The wind came to the S W, and continued so all day, with a little rain and snow. The cold did not increase. We steered N b E. At seven in the morning the variation, by a mean of several observations, was found to be 20° 38' W. We were in the evening, by all our reckonings, in the latitude of the South part of Spitzbergen, without any appearance of ice or sight of land, and with a fair wind.

28th. Less wind in the morning than the day before, with rain and sleet: continued steering to the Northward. At five in the afternoon picked up a piece of drift wood, which was fir, and not worm-eaten: sounded in 290 fathom; no ground. At six the longitude by the watch was 7° 50' E: between ten and eleven at night, saw the land to the Eastward at ten or twelve leagues distance. At midnight, dip 81° 7'.

29th. The wind Northerly; stood close in with the land. The coast appeared to be neither habitable nor accessible; it was formed by high, barren, black rocks, without the least marks of vegetation; in many places bare and pointed, in other parts covered with snow, appearing even above the clouds: the vallies between the high cliffs were filled with snow or ice. This prospect would have suggested the idea of perpetual winter, had not the mildness of the weather, the smooth water, bright sunshine, and constant day-light, given a cheerfulness and novelty to the whole of this striking and romantick scene.

I had an opportunity of making many observations near the Black Point. Latitude observed at noon 77° 59' 11''. The difference of latitude, from the last observation on the 27th at midnight to this day at noon, would according to the old method of marking the log have been two hundred and thirteen miles; which agrees

agrees exactly with the observation. At three in the afternoon, brought to and sounded 110 fathom; soft muddy ground: hoisted out the boat and tried the stream; found it, both by the common and Bouguer's log (which agreed exactly) to run half a knot North; Black Point bearing E N E. At four the longitude by the watch was $9^{\circ} 31' E$: at eight the variation, by the mean of nineteen observations, $11^{\circ} 53' W$. I could not account from any apparent cause for this great change in the variation: the weather was fine, the water smooth, and every precaution we could think of used to make the observations accurate. The dip was $80^{\circ} 25'$. Plying to the Northward.

30th. At midnight the latitude by observation was $78^{\circ} 0' 50''$. At four in the morning, by Lord Charles Cavendish's thermometer the temperature of the water at the depth of 118 fathoms was 31° of Fahrenheit's; that of the air was at the same time $40^{\circ} \frac{1}{2}$. At nine in the morning we saw a ship in the N W, standing in for the land. Having little wind this morning, and that Northerly, I stood in for the land, with an intention to have watered the ship, and got out immediately, but was prevented by the calm which followed. At noon the latitude observed was $78^{\circ} 8'$; the dip $79^{\circ} 30'$. At two in the afternoon we sounded in 115 fathom; muddy bottom: at the same time we sent down Lord Charles Cavendish's thermometer, by which we found the temperature of the water at that depth to be 33° ; that of the water at the surface was at the same time 40° , and in the air $44^{\circ} \frac{1}{2}$. Fahrenheit's thermometer plunged in water brought up from the same depth, stood at $38^{\circ} \frac{1}{2}$. This evening the master of a Greenland ship came on board, who told me, that he was just come out of the ice which lay to the Westward about sixteen leagues off, and that three ships had been lost this year, two English, and one Dutch. The weather fine, and rather warm. At six in the evening the longitude by my watch was $9^{\circ} 28' 45'' E$.

July 1st. Little wind Northerly, or calm, all day: the weather very fine, and so warm that we sat without a fire, and with one of the ports open in the cabin. At noon the latitude observed was $78^{\circ} 13' 36''$; Black Point bearing S $78^{\circ} E$; which makes the latitude of

that point nearly the same as that of the ship, and agrees very well with the chart of this coast in Purchas.

2d. Little wind, and calms, all day; the weather very fine. At six in the morning five sail of Greenlandmen in sight. At noon the latitude observed was $78^{\circ} 22' 41''$. I took a survey of the coast, as far as we could see; I took also with the megameter the altitudes of several of the mountains: but as there is nothing particularly interesting to navigators in this part of the coast, I shall only mention the height of one mountain, which was fifteen hundred and three yards. This may serve to give some idea of the appearance and scale of the coast. At half past six the longitude by the watch was $9^{\circ} 8' 30''$ E: Variation $14^{\circ} 55''$ W.

3d. Latitude at midnight $78^{\circ} 23' 46''$: Dip $80^{\circ} 45'$. The weather fine, and the wind fair all day. Running along by the coast of Spitzberger all day: several Greenlandmen in sight. Between nine and ten in the evening we were abreast of the North Foreland, bearing E b S $\frac{1}{2}$ S, distance $1 \frac{1}{2}$ mile. Sounded in twenty fathom: rocky ground.

4th. Very little wind in the morning. At noon the latitude by observation was $79^{\circ} 31'$. Magdalena Hook bore N 39° E distant about four miles; which gives the latitude of that place $79^{\circ} 34'$; the same as Fotherby observed it to be in 1614. Stood in to a small bay to the Southward of Magdalena and Hamburger's Bay: anchored with the stream anchor, and sent the boat for water. About three in the afternoon, when the boat was sent on shore, it appeared to be high water, and ebbd about three feet. This makes high water full and change at half an hour past one, or with a S S W moon; which agrees exactly with Baffin's observation in 1613. The flood comes from the Southward. Went ashore with the astronomer, and instruments, to observe the variation. A thick fog came on before we had completed the observations. The ship driving, I weighed and stood out to sea under an easy sail, firing guns frequently to shew the Carcass where we were; and in less than two hours joined her. Soon after (about four in the morning of the 5th) the Rockingham Greenland ship ran under our stern, and the master told me he had just spoke with some ships from
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which he learned, that the ice was within ten leagues of Hacluyt's Head Land, to the North West. In consequence of this intelligence, I gave orders for steering in towards the Head Land; and if it should clear up, to steer directly for it; intending to go North from thence, till some circumstance should oblige me to alter my course.

5th. At five the officer informed me, that we were very near some islands off Dane's Gat, and that the pilot wished to stand farther out; I ordered the ship to be kept N b W, and hauled farther in, when clear of the islands. At noon I steered North, seeing nothing of the land; soon after I was told that they saw the ice: I went upon deck, and perceived something white upon the bow, and heard a noise like the surf upon the shore; I hauled down the studding sails, and hailed the Carcass to let them know that I should stand for it to make what it was, having all hands upon deck ready to haul up at a moment's warning: I desired that they would keep close to us, the fog being so thick, and have every body up ready to follow our motions instantaneously, determining to stand on under such sail as should enable us to keep the ships under command, and not risk parting company. Soon after two small pieces of ice not above three feet square passed us, which we supposed to have floated from the shore. It was not long before we saw something on the bow, part black and part covered with snow, which from the appearance we took to be islands, and thought that we had not stood far enough out; I hauled up immediately to the NNW and was soon undeceived, finding it to be ice which we could not clear upon that tack; we tacked immediately, but the wind and sea both setting directly upon it, we neared it very fast, and were within little more than a cable's length of the ice, whilst in stays. The wind blowing fresh, the ships would have been in danger on the lee ice, had not the officers and men been very alert in working the ship. The ice, as far as we could then see, lay nearly E b N and W b S. At half past seven in the evening, the ship running entirely to the Southward, and the weather clearing a little, I tacked, and stood for the ice. When I saw it, I bore down to make it plain; at ten the

the ice lay from N W to East, and no opening. Very foggy, and little wind, all day; but not cold. At eleven came on a thick fog. At half past midnight, heard the surge of the ice, and hauled the wind to the Eastward.

6th. Clear weather all day, and the wind Easterly off the ice. In the morning I stood in to make the land plain. At six was within four miles of the ice, which bore from ENE to WNW: at ten near Vogel Sang: at noon, latitude observed $79^{\circ} 56' 39''$; wind Easterly. Continued plying to windward between the land and the ice: was within a quarter of a mile of the ice, which lay from ENE to NNW, when I tacked at two in the afternoon; and within half a cable's length at midnight; the Carcass was a great way astern and to leeward all day. Being so near the last rendezvous, I did not chuse to bring to for her, but was very anxious to avail myself of this favourable opportunity, having the wind off the ice and clear weather, to see whether there was any opening to the NE of the Head Land. By all the accounts from the Greenlandmen this year, and particularly the last account from the Rockingham, as well as from what we had seen ourselves, the ice appeared to be quite close to the NW. We had seen it from ESE to WNW. It was probable that the sea, if open any where, would be so to the Eastward, where the Greenlandmen do not often venture, for fear of being prevented from returning by the ice joining to Spitsbergen. I determined therefore, should the wind continue in the same quarter next day, to find whether the ice joined to the land, or was to detached as to afford me an opportunity of passing to the Eastward. In case of the ice being fast I could, with the wind Easterly, range close along the edge of it to the Westward. The weather exceedingly fine. At six in the afternoon, the longitude by the watch was $9^{\circ} 43' 30''$ E.

7th. At five in the morning the wind was Northerly, and the weather remarkably clear. Being near the ice I ranged along it. It appeared to be close all round; but I was in hopes that some opening might be found to get through to a clear sea to the Northward. I ran in amongst the small ice, and kept as close

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close as possible to the main body, not to miss any opening. At noon, Cloven Cliff W $\frac{1}{2}$ S seven leagues. At one in the afternoon, being still amongst the loose ice, I sent the boat to one of the large pieces to fill water. At four we shoaled the water very suddenly to fourteen fathom: the outer part of Cloven Cliff bore W $\frac{1}{2}$ N: Redcliff, S $\frac{1}{4}$ E. The loose ice being open to the E N E, we hauled up, and immediately deepened our water to twenty-eight fathom; muddy ground, with shells. At half past four, the ice setting very close, we ran between two pieces, and having little wind were stopped. The Carcass being very near, and not answering her helm well, was almost on board of us. After getting clear of her, we ran to the Eastward. Finding the pieces increase in number and size, and having got to a part less crowded with the drift ice, I brought to, at six in the evening, to see whether we could discover the least appearance of an opening: but it being my own opinion, as well as that of the pilots and officers, that we could go no farther, nor even remain there without danger of being beset, I sent the boat on board the Carcass for her pilots, to hear their opinion; they both declared that it appeared to them impracticable to proceed that way, and that it was probable we should soon be beset where we were, and detained there. The ice set so fast down, that before they got on board the Carcass we were fast. Captain Lutwidge hoisted our boat up, to prevent her being stove. We were obliged to heave the ship through for two hours, with ice anchors from each quarter; nor were we quite out of the ice till midnight. This is about the place where most of the old discoverers were stopped. The people in both ships being much fatigued, and the Carcass not able to keep up with us, without carrying studding-sails, I shortened sail as soon as we were quite out, and left orders to stand to the Northward under an easy sail: I intended, having failed in this attempt, to range along the ice to the N W, in hopes of an opening that way, the wind being fair, and the weather clear; resolving, if I found it all solid, to return to the Eastward, where probably it might be that

that time be broken up, which the very mild weather encouraged me to expect.

8th. Little wind in the morning, and a swell setting on the ice, we were obliged to get the boats a-head, to tow the ship clear; which they effected with difficulty. A breeze springing up when we were within two cables lengths of the main body of the ice, stood in for the land, and attacked at two, to stand to the N W for the ice; but the weather coming thick between five and six, I stood in again for the land. It clearing up soon after, I bore away again N W for the ice. At ten, spoke with a Greenland ship which had just left the ice all close to the N N W. Between eleven and twelve the wind came to the S W, with an heavy swell and thick weather. Double-reefed the topsails, and tacked at twelve, to stand in for Hacluyt's Head Land, not thinking it proper to run in with the fast ice to leeward in thick weather, without even the probability of an opening; and proposing if that weather continued, to compleat the ship's water, and be ready with the first wind, off or along the ice, to look out for an opening, and run in. To avoid any inconvenience which from the experience of the preceding day I perceived might happen, from too many running to one place on any sudden order, I divided the people into gangs under the midshipmen, and stationed them to the ice hooks, poles, crabs, and to go over upon the ice when wanted.

9th. Having a fair opportunity, and S W wind, stood to the Westward; intending, when the weather was clear, to make the ice to the Northward, and run along it. About twelve, clearer; saw the fast ice to the Northward, and the appearance of loose ice to the N W: stood directly for it, and got amongst it between two and three; steering as much to the Northward as the situation of the ice would permit. At six observed the dip $81^{\circ} 52'$. At half past seven, found the ice quite fast to the West, being in longitude $2^{\circ} 2'$ E, by our reckoning, which was the farthest to the Westward of Spitsbergen that we got this voyage. At eight the fog was so very thick, that we could neither see which way to push for an opening, nor where the Carcass was, though very near us. That we might
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not risk parting company with her, I was obliged to ply to windward under the topails, tacking every quarter of an hour to keep in the opening in which we were, and clear of the ice which surrounded us. At four in the afternoon we were in $80^{\circ} 36'$.

10th. We lost the Carcass twice in the night, from the very thick fog, and were working all night amongst the ice, making very short tacks; the opening being small, and the floating ice very thick about the ship. The situation of the people from the very fatiguing work and wet weather, made the most minute precautions necessary for the preservation of their health: we now found the advantage of the spirits which had been allowed for extraordinary occasions; as well as the additional cloathing furnished by the Admiralty. Notwithstanding every attention, several of the men were confined with colds, which affected them with pains in their bones; but, from the careful attendance given them, few continued in the sick list above two days at a time. At nine in the morning, when it cleared a little, we saw the Carcass much to the Southward of us. I took the opportunity of the clear weather to run to the Westward, and found the ice quite solid there; I then stood through every opening to the Northward, but there also soon got to the edge of the solid ice. I was forced to haul up to weather a point which ran out from it. After I had weathered that, the ice closing fast upon me, obliged me to set the foresail, which with the fresh wind and smooth water, gave the ship such way as to force through it with a violent stroke. At one in the afternoon, immediately on getting out into the open sea, we found a heavy swell setting to the Northward; though amongst the ice, the minute before, the water had been as smooth as a mill pond. The wind blew strong at SSW. The ice, as far as we could see from the mast head, lay ENE: we steered that course close to it, to look for an opening to the Northward. I now began to conceive that the ice was one compact impenetrable body, having run along it from East to West above ten degrees. I purposed, however, to stand over to the Eastward, in order to ascertain whether the body of ice joined to Spitsbergen. This the quantity of loose ice had before rendered.

dered impracticable: but thinking the Westerly winds might probably by this time have packed it all that way, I flattered myself with the hopes of meeting with no obstruction till I should come to where it joined the land; and in case of an opening, however small, I was determined at all events to push through it. The weather clearer, and the land in sight.

11th. At half past four in the morning the longitude by the lunar observation was $9^{\circ} 42'$ E. And at the same time by my watch $9^{\circ} 2'$ E. Cloven Cliff S S E, distant eight miles. This would make the longitude of Cloven Cliff $9^{\circ} 38'$ E; which is within twenty minutes of what it was determined by the observations and survey taken in Fair Haven. At noon the latitude observed was $80^{\circ} 4'$; Vogel Sang W S W. Little wind and a great swell in the morning. Calm most part of the day.

12th. Calm all day, with a great swell from the S W, and the weather remarkably mild. At eight in the evening longitude by the watch $10^{\circ} 54' 30''$ E: Cloven Cliff S W b S, 'The Carcass drove with the current so near the main body of the ice, as to be obliged to anchor; she came to in twenty-six fathom water.

13th. Calm till noon, the ship driving to the Westward with the current, which we observed to be very irregular, the Carcass being driven at the same time to the Eastward. Near the main body of the ice, the detached pieces probably affect the currents, and occasion the great irregularity which we remarked. We had found an heavy swell from the S W these two days. At two in the afternoon it came on very suddenly to blow fresh from that quarter, with foggy weather: we worked into Vogel Sang, and anchored with the best bower in eleven fathom, soft clay.

The place where we anchored is a good roadstead, open from the N E to the N W. The Northeasternmost point is the Cloven Cliff, a bare rock so called from the top of it resembling a cloven hoof, which appearance it has always worn, having been named by some of the first Dutch navigators who frequented these seas. This rock being entirely detached from the other mountains, and joined to the rest of the island

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island by a low narrow isthmus, preserves in all situations the same form; and being nearly perpendicular, it is never disguised by snow. These circumstances render it one of the most remarkable points on the coast. The Northwesternmost land is an high bluff point, called by the Dutch, Vogel Sang. This sound, though open to the Northward, is not liable to any inconvenience from that circumstance, the main body of the ice lying so near as to prevent any great sea; nor are ships in any danger from the loose ice setting in, as this road communicates with several others formed by different islands, between all which there are safe passages. To all the sounds and harbours formed by this knot of Islands, the old English navigators had given the general name of Fair Haven; of which Fotherby took a in *plat* 1614: that in which the Racehorse and Carcass lay at this time they called the North Harbour; the harbour of Smeerenberg, distant about eleven miles, (in which we anchored in August) they named the South Harbour. Besides these, there are several others; particularly two, called, Cook's Hole, and the Norways, in both which several Dutch ships were lying at this time. Here the shore being steep-to, we completed our water with great ease, from the streams which fall in many places down the sides of the rocks, and are produced by the melting of the snow. I fixed upon a small flat island, or rock, about three miles from the ship, and almost in the center of those islands which form the many good roads here, as the properest place for erecting a tent, and making observations. The foggy weather on the 14th prevented us from using the instruments that day. I regretted this circumstance much, fearing it would deprive me of the only probable opportunity of making observations on shore in those high latitudes, as our water was nearly recruited: however, having little wind with the weather very fair from the 15th to the 18th in the morning, I made the best use of that time. Even in the clearest weather here, the sky was never free from clouds, which prevented our seeing the moon during the whole of our stay, or even being sure of our solar observations, Mr. Lyons never having been able to

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get equal altitudes for settling the rates of going of the time-keepers. Once indeed we were fortunate enough to observe a revolution of the sun, of which I availed myself to determine the going of the pendulum adjusted to vibrate seconds at London. During the course of this experiment, a particular and constant attention was paid to the state of the thermometer, which I was surprised to find differ so little about noon and midnight; its greatest height was $58^{\circ}\frac{1}{2}$, at eleven in the forenoon; at midnight it was 51° .

On the 16th, at noon, the weather was remarkably fine and clear. The thermometer in the shade being at 49° , when exposed to the sun rose in a few minutes to $89^{\circ}\frac{1}{2}$ and remained so for some time, till a small breeze springing up, made it fall 10° almost instantly. The weather at this time was rather hot; so that I imagine, if a thermometer was to be graduated according to the feelings of people in these latitudes, the point of temperature would be about the 44th degree of Fahrenheit's scale. From this island I took a survey, to ascertain the situation of all the points and openings, and the height of the most remarkable mountains: the longest base the island would afford was only 618 feet, which I determined by a cross base, as well as actual measurement, and found the results not to differ above three feet. To try how far the accuracy of this survey might be depended upon, I took in a boat, with a small Hadley's sextant, the angles between seven objects, which intersected exactly when laid down upon the plan. I had a farther proof of its accuracy some days after, by taking the bearings of Vogel Sang and Hacluyt's Head Land in one, which corresponded exactly with their position on my chart.

On the 17th, the weather being very clear, I went up one of the hills, from which I could see several leagues to the NE: the ice appeared uniform and compact, as far as my view extended. During our stay here, we found the latitude of the island on which the observations were made, to be $79^{\circ} 50'$; longitude $10^{\circ} 2' 30''$ E; variation $20^{\circ} 38'$ W; dip $82^{\circ} 7'$: latitude of Cloven Cliff $79^{\circ} 53'$; longitude $9^{\circ} 53' 30''$ E: Hacluyt's Head Land $79^{\circ} 47'$; longitude

tude $9^{\circ} 11' 30''$ E. The tide rose about four feet, and flowed at half an hour after one, full and change. The tide set irregularly, from the number of islands between which it passed; but the flood appeared to come from the Southward.

18th. The calm weather since the 14th had given us full time to finish the observations, and complete our water: a breeze springing up in the morning, I went ashore to get the instruments on board. Between one and two we weighed, with the wind Westerly, and stood to the Northward. Between eleven and twelve at night, having run about eight leagues, we were prevented by the ice from getting farther. We stood along the edge of it to the Southward. At two in the morning, being embayed by the ice, I tacked, and left orders to stand to the Eastward along the edge of the ice, as soon as we could weather the point; hoping, if there should be no opening, between the land and the ice, that I should at least be able to ascertain where they joined, and perhaps to discover from the land, whether there was any prospect of a passage that way: At that time the ice was all solid as far as we could see, without the least appearance of water to the Northward.

19th. At six in the morning we had got to the Eastward among the loose ice which lay very thick in shore, the main body to the Northward and Eastward: the land near Deer Field not four miles off, and the water shoaled to twenty fathoms. Here we found ourselves nearly in the same place where we had twice been stopped, the ice situated as before, locked with the land without any passage either to the Eastward or Northward: I therefore stood back to the Westward. At noon the Northernmost part of Vogel Sang bore S W b S, distant about seven leagues. The weather being very fine, and the wind to the Eastward, we were enabled to coast along the ice to the Westward, hauling into all the bays, going round every point of ice in search of an opening, and standing close along by the main body all day, generally within a ship's length.

20th. At half after three in the morning the land was out of sight, and we imagined ourselves in rather more than eighty degrees and an half; some of the
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the openings being near two leagues deep, had flattered us with hopes of getting to the Northward; but these openings proved to be no more than bays in the main body of the ice. About one in the afternoon, we were by our reckoning in about $80^{\circ} 34'$, nearly in the same place where we had been on the 9th. About three we bore away for what appeared like an opening to the S W; we found the ice run far to the Southward.

21st. We still continued to run along the edge of the ice, which trended to the Southward. At noon we were in the latitude of $79^{\circ} 26'$, by observation, which was twenty-five miles to the Southward of our reckoning. Finding that the direction of the ice led us to the Southward, and that the current set the same way, I stood to the Northward and Westward close along the ice, to try whether the sea was opened to the Northward by the wind from that quarter. At nine in the evening we had no ground with 200 fathom of line. At ten we got into a stream of loose ice. The weather fine, but cool all day, and sometimes foggy.

22d. At two in the morning we bore away to the N E, for the main body of the ice; the weather became foggy soon afterwards. At six we saw the ice; and the weather being still foggy, we hauled up to the S S E, to avoid being embayed in it. The air very cold.

23d. At midnight, tacked for the body of the ice. Latitude observed $80^{\circ} 13' 38''$. Rainy in the morning; fair in the afternoon; still working up to the Northward and Eastward, with the wind Easterly. At six in the evening, the Cloven Cliff bearing South about six leagues, sounded in 200 fathom, muddy ground; the lead appeared to have sunk one third of its length in the mud. At two in the morning, with little wind, and a swell from the South West, I stood to the Northward amongst the loose ice: at half past two the main body of the ice a cable's length off, and the loose ice so close that we wore ship, not having room or way enough to tack; struck very hard against the ice in getting the ship round, and got upon one piece, which lifted her in the water for near a minute, before her weight broke it. The ships had been so well strengthened,

strengthened, that they received no damage from these strokes; and I could with the more confidence push through the loose ice, to try for openings. Hacluyt's Head Land bore S 50° W distant about seven leagues.

24th. By this situation of the ice we were disappointed of getting directly to the Northward, without any prospect after so many fruitless attempts of being able to succeed to the Westward; nor indeed, could I with an Easterly wind and heavy swell attempt it, as the wind from that quarter would not only pack the loose ice close to the Westward, but by setting the sea on it, make it as improper to be approached as a rocky lee shore. To the Eastward on the contrary it would make smooth water, and detach all the loose ice from the edges; perhaps break a stream open, and give us a fair trial to the Northward; at all events, with an Easterly wind we could run out again, if we did not find it practicable to proceed. Finding the ice so fast to the Northward and Westward, it became a desirable object to ascertain how far it was possible to get to the Eastward, and by that means pursue the voyage to the Northward. These considerations determined me to ply to the Eastward, and make another push to get through where I had been three times repulsed. In working to the Eastward, we kept as near the body of the ice as possible. At noon the Cloven Cliff bore S W b S about seven leagues. At six we were working to the NE, and at nine we steered to the SE, the ice appearing more open that way: we had fresh gales and cloudy weather. The ship struck very hard in endeavouring to force through the loose ice. At midnight the wind freshened, and we double reefed the topsails. It was probably owing to the fresh gales this day, as well as to the summer being more advanced, that we were enabled to get farther than in any of our former attempts this way. We continued coasting the ice, and at two in the morning the North part of Vogel Sang and Hacluyt's Head Land in one bore S 65° W; Cloven Cliff S 52° W; the nearest part of the shore about three leagues off. When I left the deck, at four in the morning, we were very near the spot where the ships had been fast in the ice on the 7th in the evening, but rather farther to the Eastward;

we had passed over the same shoal water we had met with that day, and were now in twenty-fathom, rocky ground; still amongst loose ice, but not so close as we had hitherto found it.

25th. At seven in the morning we had deepened our water to fifty-five fathom, and were still amongst the loose ice. At noon we had deepened our water to seventy fathom, with muddy bottom, at the distance of about three miles from the nearest land. By two in the afternoon we had passed Deer Field, which we had so often before attempted without success; and finding the sea open to the NE, had the most flattering prospect of getting to the Northward. From this part, all the way to the Eastward, the coast wears a different face; the mountains, though high, are neither so steep or sharp pointed, nor of so black a colour as to the Westward. It was probably owing to this remarkable difference in the appearance of the shore, that the old navigators gave to places hereabouts the names of *Red Beach*, *Red Hill*, and *Red Cliff*. One of them, speaking of this part, has described the whole country in a few words: "Here (says he) I saw a more
" natural earth and clay than any that I have seen in
" all the country, but nothing growing thereupon more
" than in other places." At two in the afternoon we had little wind, and were in sight of Mofsen Island, which is very low and flat.

The Carcass being becalmed very near the island in the evening, Captain Lutwidge took that opportunity of obtaining the following exact account of its extent, which he communicated to me.

" At 10 P M, the body of Mofsen Island bearing
" E b S distant two miles; sounded thirteen fathoms;
" rocky ground, with light brown mud, and broken
" shells. Sent the master on shore, who found the
" island to be nearly of a round form, about two miles
" in diameter, with a lake or large pond of water in
" the middle, all frozen over, except thirty or forty
" yards round the edge of it, which was water, with
" loose pieces of broken ice, and so shallow they
" walked through it, and went over upon the firm
" solid ice. The ground between the sea and the
" pond is from half a cable's length to a quarter of a
" mile

“ mile broad, and the whole island covered with gravel and small stones, without the least verdure or vegetation of any kind. They saw only one piece of drift wood (about three fathom long, with a root on it, and as thick as the Carcass’s mizen mast) which had been thrown up over the high part of the land, and lay upon the declivity towards the pond. They saw three bears, and a number of wild ducks, geese, and other sea fowls, with birds nests all over the island. There was an inscription over the grave of a Dutchman, who was buried there in July 1771. It was low water at eleven o’clock when the boat landed, and the tide appeared to flow eight or nine feet ; at that time we found a current carrying the ship to the N W from the island, which before carried us to the S E (at the rate of a mile an hour) towards it. On the West side is a fine white sandy bottom, from two fathoms, at a ship’s length from the beach, to five fathoms, at half a mile’s distance off.”

The soundings all about this island, and to the Eastward, seem to partake of the nature of the coast. To the Westward the rocks were high, and the shores bold and steep too ; here the land shelved more, and the soundings were shoal, from thirteen to ten fathom. It appears extraordinary that none of the old navigators, who are so accurate and minute in their descriptions of the coast, have taken any notice of this island, so remarkable and different from every thing they had seen on the Western coast ; unless we should suppose that it did not then exist, and that the streams from the great ocean up the West side of Spitsbergen, and through the Waygat’s Straits, meeting here, have raised this bank, and occasioned the quantity of ice that generally blocks up the coast hereabouts.—At four in the afternoon, hoisted out the boat, and tried the current, which set N E b E, at the rate of three quarters of a mile an hour. At midnight, Mofsen Island bore from S E b S to S b W, distant about five miles.

26th. About two in the morning, we had little wind, with fog ; made the signals to the Carcass, for keeping company. At half an hour after three in the afternoon, we were in longitude $12^{\circ} 20' 45''$ E ; variation,

riation, by the mean of five azimuths, $12^{\circ} 47'$ W. At nine we saw land to the Eastward; steering to the Northward with little wind, and no ice in sight, except what we had passed.

27th. Working still to the NE, we met with some loose ice; however from the openness of the sea hitherto, since we had passed Deer Field, I had great hopes of getting far to the Northward; but about noon, being in the latitude of eighty and forty-eight, by our reckoning, we were stopped by the main body of the ice, which we found lying in a line, nearly East and West, quite solid. Having tacked, I brought to, and founded close to the edge of the ice, in 79 fathom, muddy bottom.

The wind being still Easterly, I worked up close to the edge of the ice, coasting it all the way. At six in the evening we were in longitude $14^{\circ} 59' 30''$ E, by observation.

28th. At midnight the latitude observed was $80^{\circ} 37'$. The main body of the ice still lying in the same direction, we continued working to the Eastward, and found several openings to the Northward, of two or three miles deep; into every one of which we ran, forcing the ship, wherever we could, by a press of sail, amongst the loose ice, which we found here in much larger pieces than to the Westward. At six in the morning the variation, by the mean of six azimuths, was $11^{\circ} 56'$ W; the horizon remarkably clear. At noon, being close to the main body of the ice, the latitude by observation was $80^{\circ} 36'$: we sounded in 101 fathom, muddy ground. In the afternoon the wind blew fresh at NE, with a thick fog; the ice hung much about the rigging. The loose ice being thick and close, we found ourselves so much engaged in it, as to be obliged to run back a considerable distance to the Westward and Southward, before we could extricate ourselves: we afterwards had both the sea and the weather clear, and worked up to the North Eastward. At half past five the longitude of the ship was $15^{\circ} 16' 45''$ E. At seven the Easternmost land bore $E \frac{1}{2} N$, distant about seven or eight leagues, appearing like deep bays and islands, probably those called in the Dutch charts the *Seven Islands*; they seemed to be sur-
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rounded with ice. I stood to the Southward, in hopes of getting to the Southeastward round the ice, and between it and the land, where the water appeared more open.

29th. At midnight the latitude by observation was 80° 21'. At four, tacked close to the ice, hauled up the foresail and backed the mizen top-sail, having too much way amongst the loose ice. At noon, latitude observed 80° 24' 56". An opening, which we supposed to be the entrance of Waygat's Straits, bore South; the Northernmost land NE b E; the nearest shore distant about four miles. In the afternoon the officer from the deck came down to tell me, we were very near a small rock even with the water's edge; on going up, I saw it within little more than a ship's length on the lee bow, and put the helm down: before the ship got round, we were close to it, and perceived it to be a very small piece of ice, covered with gravel. In the evening, seeing the Northern part of the islands only over the ice, I was anxious to get round it, in hopes of finding an opening under the land. Being near a low flat island opposite the Waygat's Straits, not higher, but much larger than Moffen Island, we had an heavy swell from the Southward, with little wind, and from ten to twenty fathom: having got past this island, approaching to the high land to the Eastward, we deepened our water very suddenly to 117 fathom. Having little wind, and the weather very clear, two of the officers went with a boat in pursuit of some sea-horses, and afterwards to the low island. At midnight we found by observation the latitude 80° 27' 3", and the dip 82° 2' $\frac{1}{2}$. At four in the morning I found, by Bouguer's log, that the current set two fathoms to the Eastward. At six in the morning the officers returned from the island; in their way back they had fired at, and wounded a sea-horse, which dived immediately, and brought up with it a number of others. They all joined in an attack upon the boat, wrested an oar from one of the men, and were with difficulty prevented from staving or oversetting her; but a boat from the Carcass joining ours, they dispersed. One of that ship's boats had before been attacked in

in the same manner off Moffen Island. From Dr. Irving, who went on this party, I had the following account of the low island.

“ We found several large fir trees lying on the shore, sixteen or eighteen feet above the level of the sea: some of these trees were seventy feet long, and had been torn up by the roots; others cut down by the axe, and notched for twelve feet lengths: this timber was no ways decayed, or the strokes of the hatchet in the least effaced. There were likewise some pipe-staves, and wood fashioned for use. The beach was formed of old timber, sand, and whale-bones.

“ The island is about seven miles long, flat, and formed chiefly of stones from eighteen to thirty inches over, many of them hexagons, and commonly placed for walking on: the middle of the island is covered with moss, scurvy grass, sorrel, and a few ranunculuses then in flower. Two reindeer were feeding on the moss; one we killed, and found it fat, and of high flavour. We saw a light grey-coloured fox; and a creature somewhat larger than a weasel, with short ears, long tail, and skin spotted white and black. The island abounds with small snipes, similar to the jack-snipe in England. The Ducks were now hatching their eggs, and many wild geese feeding by the water side.”

When I left the deck at six in the morning, the weather was remarkably clear, and quite calm. To the N E, amongst the islands, I saw much ice, but also much water between the pieces; which gave me hopes that when a breeze sprung up, I should be able to get to the Northward by that way.

30th. Little winds, and calm all day; we got something to the Northward and Eastward. At noon we were by observation in latitude $80^{\circ} 31'$. At three in afternoon we were in longitude $18^{\circ} 48' E$, being amongst the islands, and in the ice, with no appearance of an opening for the ship. Between eleven and twelve at night I sent the master, Mr. Crane, in the four-oared boat, amongst the ice, to try whether he could get the boat through, and find any opening for the ship which might give us a prospect of getting farther; with directions if he could reach the shore to go up one of the

the mountains, in order to discover the state of the ice to the Eastward and Northward. At five in the morning, the ice being all round us, we got out our ice-anchors, and moored along-side a field. The master returned between seven and eight, and with him Captain Lutwidge, who had joined him on shore. They had ascended an high mountain, from whence they commanded a prospect extending to the East and North East ten or twelve leagues, over one continued plain of smooth unbroken ice, bounded only by the horizon: they also saw land stretching to the S E, laid down in the Dutch charts as islands. The main body of ice, which we had traced from West to East, they now perceived to join to these islands, and from them to what is called the North East land. In returning, the ice having closed much since they went, they were frequently forced to haul the boat over it to other openings. The weather exceedingly fine and mild, and unusually clear. The scene was beautiful and picturesque; the two ships becalmed in a large bay, with three apparent openings between the islands which formed it, but every where surrounded with ice as far as we could see, with some streams of water; not a breath of air; the water perfectly smooth; the ice covered with snow, low, and even, except a few broken pieces near the edges: the pools of water in the middle of the pieces were frozen over with young ice.

31st. At nine in the morning, having a light breeze to the Eastward, we cast off, and endeavoured to force through the ice. At noon the ice was so close, that being unable to proceed, we moored again to a field. In the afternoon we filled our cask with fresh water from the ice, which we found very pure and soft. The Carcass moved, and made fast to the same field with us. The ice measured eight yards ten inches in thickness at one end, and seven yards eleven inches at the other. At four in the afternoon the variation was $12^{\circ} 24' W$: at the same time the longitude $19^{\circ} 0' 15'' E$; by which we found that we had hardly moved to the Eastward since the day before. Calm most part of the day; the weather very fine; the ice closed fast, and was all round the ships; no opening to be seen anywhere, except an hole of about a mile and a half, where
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The ships lay fast to the ice with ice-anchors. We completed the water. The ship's company were playing on the ice all day. The pilots being much farther than they had ever been, and the season advancing, seemed alarmed at being beset.

August 1st. The ice pressed in fast; there was not now the smallest opening; the two ships were within less than two lengths of each other, separated by ice, and neither having room to turn. The ice, which had been all flat the day before, and almost level with the water's edge, was now in many places forced higher than the main yard, by the pieces squeezing together. Our latitude this day at noon, by the double altitude, was $80^{\circ} 37'$.

2d. Thick foggy wet weather, blowing fresh to the Westward; the ice immediately about the ships rather looser than the day before, but yet hourly setting in so fast upon us, that there seemed to be no probability of getting the ships out again, without a strong East, or North East wind. There was not the smallest appearance of open water, except a little towards the West point of the North East land. The seven islands and North East land, with the frozen sea, formed almost a basin, leaving but about four points opening for the ice to drift out, in case of a change of wind.

3d. The weather very fine, clear, and calm; we perceived that the ships had been driven far to the Eastward; the ice was much closer than before, and the passage by which we had come in from the Westward closed up, no open water being in sight, either in that or any other quarter. The pilots having expressed a wish to get if possible farther out, the ships companies were set to work at five in the morning, to cut a passage through the ice, and warp through the small openings to the Westward. We found the ice very deep, having sawed sometimes through pieces twelve feet thick. This labour was continued the whole day, but without any success; our utmost efforts not having moved the ships above three hundred yards to the Westward through the ice, at the same time that they had been driven (together with the ice itself, to which they were fast) far to the NE and Eastward by the current; which had also forced the loose ice from the Westward

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Westward, between the islands, where it became packed, and as firm as the main body.

4th. Quite calm till evening, when we were flattered with a light air to the Eastward, which did not last long, and had no favourable effect. The wind was now at N W, with a very thick fog, the ship driving to the Eastward. The pilots seemed to apprehend that the ice extended very far to the Southward and Westward.

5th. The probability of getting the ships out appearing every hour less, and the season being already far advanced, some speedy resolution became necessary as to the steps to be taken for the preservation of the people. As the situation of the ships prevented us from seeing the state of the ice to the Westward, by which our future proceedings must in a great measure be determined, I sent Mr. Walden, one of the midshipmen, with two pilots, to an island about twelve miles off, which I have distinguished in the chart by the name of Walden's island, to see where the open water lay.

6th. Mr. Walden and the pilots, who were sent the day before to examine the state of the ice from the island, returned this morning with an account, that the ice, though close all about us, was open to the Westward, round the point by which we came in. They also told me, that when upon the island they had the wind very fresh to the Eastward, though where the ships lay it had been almost calm all day. This circumstance considerably lessened the hopes we had hitherto entertained of the immediate effect of an Easterly wind in clearing the bay. We had but one alternative; either patiently to wait the event of the weather upon the ships, in hopes of getting them out, or to betake ourselves to the boats. The ships had driven into shoal water, having but fourteen fathom. Should they, or the ice to which they were fast, take the ground, they must be inevitably lost, and probably overfet. The hopes of getting the ships out was not hastily to be relinquished, nor obstinately adhered to, till all other means of retreat were cut off. Having no harbour to lodge them in, it would be impossible to winter them here, with any probability of their being again serviceable; our provisions would be very short for such an undertaking.

taking, were it otherwise feasible; and supposing, what appeared impossible, that we could get to the nearest rocks, and make some conveniences for wintering, being now in an unfrequented part, where ships never even attempt to come, we should have the same difficulties to encounter the next year, without the same resources; the remains of the ship's company, in all probability, not in health; no provisions; and the sea not so open, this year having certainly been uncommonly clear. Indeed it could not have been expected that more than a very small part should survive the hardships of such a winter with every advantage; much less in our present situation. On the other hand, the undertaking to move so large a body for so considerable a distance by boats, was not without very serious difficulties. Should we remain much longer here, the bad weather must be expected to set in. The stay of the Dutchmen to the Northward is very doubtful: if the Northern harbours keep clear, they stay till the beginning of September; but when the loose ice sets in, they quit them immediately. I thought it proper to send for the officers of both ships, and informed them of my intention of preparing the boats for going away. I immediately hoisted out the boats, and took every precaution in my power to make them secure and comfortable: the fitting would necessarily take up some days. The water shoaling, and the ships driving fast towards the rocks to the NE, I ordered carcasses bread-bags to be made, in case it should be necessary very suddenly to betake ourselves to the boats: I also sent a man with a lead and line to the Northward, and another from the Carcass to the Eastward, to sound wherever they found cracks in the ice, that we might have notice before either of the ships, or the ice to which they were fast, took the ground; as in that case, they must instantly have been crushed or over-set. The weather bad; most part of the day foggy, and rather cold.

7th. In the morning I set out with a Launch over the ice; she hauled much easier than I could have expected; we got her about two miles. I then returned with the people for their dinner. Finding the ice rather more open near the ships, I was encouraged to attempt

attempt moving them. The wind being Easterly, though but little of it, we set the sails, and got the ships about a mile to the Westward. They moved indeed, but very slowly, and were not now by a great deal so far to the Westward as where they were beset. However, I kept all the sail upon them, to force through whenever the ice slackened the least. The people behaved very well in hauling the boat; they seemed reconciled to the idea of quitting the ships, and to have the fullest confidence in their officers. The boats could not with the greatest diligence be got to the water side before the fourteenth; if the situation of the ships did not alter by that time, I should not be justified in staying longer by them. In the mean time I resolved to carry on both attempts together, moving the boats constantly, but without omitting any opportunity of getting the ships through.

8th. At half past four, sent two pilots with three men to see the state of the ice to the Westward, that I might judge of the probability of getting the ships out. At nine they returned, and reported the ice to be very heavy and close, consisting chiefly of large fields. Between nine and ten this morning, I set out with the people, and got the Launch above three miles. The weather being foggy, and the people having worked hard, I thought it best to return on board between six and seven. The ships had in the mean time moved something through the ice, and the ice itself had drifted still more to the Westward. At night there was little wind, and a thick fog, so that I could not judge precisely of the advantage we had gained; but I still feared that, however flattering, it was not such as to justify my giving up the idea of moving the boats, the season advancing so fast, the preservation of the ships being so uncertain, and the situation of the people so critical.

9th. A thick fog in the morning: we moved the ship a little through some very small openings. In the afternoon, upon its clearing up, we were agreeably surprized to find the ships had driven much more than we could have expected to the Westward. We worked hard all day, and got them something more to the Westward through the ice; but nothing in comparison

comparison to what the ice itself had drifted. We got past the Launches; I sent a number of men for them, and got them on board. Between three and four in the morning the wind was Westerly, and it snowed fast. The people having been much fatigued, we were obliged to desist from working for a few hours. The progress which the ships had made through the ice was, however, a very favourable event: the drift of the ice was an advantage that might be as suddenly lost, as it had been unexpectedly gained, by a change in the current: we had experienced the inefficacy of an Easterly wind when far in the bay, and under the high land; but having now got through so much of the ice, we began again to conceive hopes that a brisk gale from that quarter would soon effectually clear us.

10th. The wind springing up to the NNE in the morning, we set all the sail we could upon the ship, and forced her through a great deal of very heavy ice: she struck often very hard, and with one stroke broke the shank of the best bower anchor. About noon we had got her through all the ice, and out to sea. I stood to the NW to make the ice, and found the main body just where we left it. At three in the morning, with a good breeze Easterly, we were standing to the Westward, between the land and the ice, both in sight; the weather hazy.

11th. Came to an anchor in the harbour of Smeerenberg, to refresh the people after their fatigues. We found here four of the Dutch ships, which we had left in the Norways when we sailed from Vogel Sang, and upon which I had depended for carrying the people home in case we had been obliged to quit the ships. In this Sound there is good anchorage in thirteen fathom, sandy bottom, not far from the shore: it is well sheltered from all winds. The island close to which we lay is called Amsterdam Island, the Westernmost point of which is Hacluyt's Head Land: here the Dutch used formerly to boil their whale-oil, and the remains of some conveniences erected by them for that purpose are still visible. Once they attempted to make an establishment, and left some people to winter here, who all perished. The Dutch ships still resort to this place for the latter season of the whale fishery.

12th. Got the instruments on shore, and the tent pitched; but could not make any observations this day or the next, from the badness of the weather.

13th. Rain, and blowing hard: two of the Dutch ships sailed for Holland.

14th. The weather being fine and little wind, we began our observations.

18th. Completed the observations. Calm all day. During our stay, I again set up the pendulum, but was not so fortunate as before, never having been able to get an observation of a revolution of the sun, or even equal altitudes for the time. We had an opportunity of determining the refraction at midnight, which answered within a few seconds to the calculation in Dr. Bradley's table, allowing for the barometer and thermometer. Being within sight of Cloven Cliff, I took a survey of this part of Fair Haven, to connect it with the plan of the other part. Dr. Irving climbed up a mountain, to take its height with the barometer, which I determined at the same time geometrically with great care. By repeated observations here we found the latitude to be $79^{\circ} 44'$, which by the survey corresponded exactly with the latitude of Cloven Cliff, determined before; the longitude $9^{\circ} 50' 45''$ E; dip $82^{\circ} 8' \frac{1}{2}$; variation $18^{\circ} 57' W$; which agrees also with the observation made on shore in July. The tide flowed here half past one, the same as in Vogel Sang harbour.

Opposite to the place where the instruments stood, was one of the most remarkable Icebergs in this country. Icebergs are large bodies of ice filling the vallies between the high mountains; the face towards the sea is nearly perpendicular, and of a very lively light green colour. This was about three hundred feet high, with a cascade of water issuing out of it. The black mountains, white snow, and beautiful colour of the ice, make a very romantick and uncommon picture. Large pieces frequently break off from the Icebergs, and fall with great noise into the water: we observed one piece which had floated out into the bay, and grounded in twenty-four fathom; it was fifty feet high above the surface of the water, and of the same beautiful colour as the Iceberg.

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I shall here mention such general observations as my short stay enabled me to make. The stone we found was chiefly a kind of marble, which dissolved easily in the marine acid. We perceived no marks of minerals of any kind, nor the least appearance of present, or remains of former Volcanoes. Neither did we meet with insects, or any species of reptiles; not even the common earthworm. We saw no springs or rivers, the water, which we found in great plenty, being all produced by the melting of the snow from the mountains. During the whole time we were in these latitudes, there was no thunder or lightning. I must also add, that I never found what is mentioned by Marten (who is generally accurate in his observations, and faithful in his accounts) of the sun at midnight resembling in appearance the moon; I saw no difference in clear weather between the sun at midnight and any other time, but what arose from a different degree of altitude; the brightness of the light appearing there, as well as elsewhere, to depend upon the obliquity of his rays. The sky was in general loaded with hard white clouds; so that I do not remember to have ever seen the sun and the horizon both free from them even in the clearest weather. We could always perceive when we were approaching the ice, long before we saw it, by a bright appearance near the horizon, which the pilots called the *blink of the ice*. Hudson remarked that the sea where he met with ice was blue; but the green sea was free from it. I was particularly attentive to observe this difference, but could never discern it.

The driftwood in these seas has given rise to various opinions and conjectures, both as to its nature and the place of its growth. All that which we saw (except the pipe-staves taken notice of by Doctor Irving on the Low Island) was fir, and not worm-eaten. The place of its growth I had no opportunity of ascertaining.

The nature of the ice was a principal object of attention in this climate. We found always a great swell near the edge of it; but whenever we got within the loose ice, the water was constantly smooth. The loose fields and flaws, as well as the interior part of the fixed ice, were flat, and low: with the wind blowing

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blowing on the ice, the loose parts were always, to use the phrase of the Greenlandmen, *packed*; the ice at the edges appearing rough and piled up; this roughness and height I imagine to proceed from the smaller pieces being thrown up by the force of the sea on the solid part. During the time that we were fast amongst the Seven Islands, we had frequent opportunities of observing the irresistible force of the large bodies of floating ice. We have often seen a piece of several acres square lifted up between two much larger pieces, and as it were becoming one with them; and afterwards this piece so formed acting in the same manner upon a second and third; which would probably have continued to be the effect, till the whole bay had been so filled with ice that the different pieces could have had no motion, had not the stream taken an unexpected turn, and set the ice out of the bay.

19th. Weighed in the morning with the wind at N N E. Before we got out of the bay it fell calm. I observed for these three or four days, about eleven in the evening, an appearance of Dusk.

20th. At midnight, being exactly in the latitude of Cloven Cliff, Mr. Harvey took an observation for the refraction; which we found to agree with the tables. The wind Southerly all day, blowing fresh in the afternoon. About noon fell in with a stream of loose ice, and about four made the main ice near us. We stood to the W N W along it at night, and found it in the same situation as when we saw it before; the wind freshened and the weather grew thick, so that we lost sight of it, and could not venture to stand nearer, the wind being S S W.

21st. At two in the morning we were close in with the body of the West ice, and obliged to tack for it; blowing fresh, with a very heavy sea from the Southward. The wind abated in the afternoon, but the swell continued, with a thick fog.

22d. The wind sprung up Northerly, with a thick fog; about noon moderate and clearer; but coming on to blow fresh again in the evening, with a great sea, and thick fog, I was forced to haul more to the Eastward, lest we should be embayed, or run upon lee ice.

The season was so very far advanced, and fogs as well

well as gales of wind so much to be expected, that nothing more could now have been done, had any thing been left untried. The summer appears to have been uncommonly favourable for our purpose, and afforded us the fullest opportunity of ascertaining repeatedly the situation of that wall of ice, extending for more than twenty degrees between the latitudes of eighty and eighty-one, without the smallest appearance of any opening.

I should here conclude the account of the voyage, had not some observations and experiments occurred on the passage home.

In steering to the Southward we soon found the weather grow more mild, or rather to our feelings warm. August 24th, we saw Jupiter: the sight of a star was now become almost as extraordinary a phenomenon, as the sun at midnight when we first got within the arctic circle. The weather was very fine for some part of the voyage; on the 4th of September, the water being perfectly smooth with a dead calm, I repeated with success the attempt I had made to get soundings in the main ocean at great depths, and struck ground in six hundred and eighty-three fathoms; the bottom was a fine soft blue clay. From the 7th of September, when we were off Shetland, till the 24th, when we made Orfordness, we had very hard gales of wind with little intermission, which were constantly indicated several hours before they came on by the fall of the barometer, and rise of the manometer: this proved to me the utility of those instruments at sea. In one of these gales, the hardest, I think, I ever was in, and with the greatest sea, we lost three of our boats, and were obliged to heave two of our guns overboard, and bear away for some time, though near a lee shore, to clear the ship of water. I cannot omit this opportunity of repeating, that I had the greatest reason on this, as well as every other critical occasion, to be satisfied with the behaviour both of the officers and seamen. In one of these gales on the 12th of September, Dr. Irving tried the temperature of the sea in that state of agitation, and found it considerably warmer than that of the atmosphere. This observation is the more interesting, as it agrees with a passage in Plutarch's *Natural Questions*, not (I believe) before taken notice of, or confirmed by experiment, in which he remarks,

“ that

“ that the sea becomes warmer by being agitated in
“ waves.”

The frequent and very heavy gales at the latter end of the year, confirmed me in the opinion, that the time of our sailing from England was the properest that could have been chosen. These gales are as common in the Spring as in the Autumn : there is every reason to suppose therefore, that at an early season we should have met with the same bad weather in going out as we did on our return. The unavoidable necessity of carrying a quantity of additional stores and provisions, rendered the ships so deep in the water, that in heavy gales the boats, with many of the stores, must probably have been thrown over board ; as we experienced on our way home, though the ships were then much lightened by the consumption of provisions, and expenditure of stores. Such accidents in the outset must have defeated the voyage. At the time we sailed, added to the fine weather, we had the further advantage of nearly reaching the latitude of eighty without seeing ice, which the Greenlandmen generally fall in with in the latitude of seventy-three or seventy-four. There was also most probability, if ever navigation should be practicable to the Pole, of finding the sea open to the Northward after the solstice ; the sun having then exerted the full influence of his rays, though there was enough of the summer still remaining for the purpose of exploring the seas to the Northward and Westward of Spitsbergen.

F I N I S